

*CLAIMS*

We claim:

1. In a method using a scrubber for receiving and scrubbing an industrial gas containing oxidized mercury with an aqueous alkali reagent, the improvement comprising:  
5 adding hydrogen sulfide to the industrial gas; and scrubbing the industrial gas in the scrubber.

2. The method according to claim 1, comprising the step of adding the hydrogen sulfide to the industrial gas in the scrubber.

3. The method according to claim 1, wherein the scrubber is a wet scrubber and further comprising the steps of conveying the industrial gas through one of a fabric filter and electrostatic precipitator to remove particulates from the industrial gas and then providing the  
10 industrial gas to the wet scrubber.

4. The method according to claim 1, comprising the step of supplying the hydrogen sulfide to the industrial gas at a rate sufficient to produce a concentration of hydrogen sulfide in the industrial gas of about 0.05 to 10 ppm.

5. The method according to claim 1, comprising the step of adding an acid to a solution of one of aqueous sodium sulfide and potassium sulfide to generate the hydrogen sulfide.  
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6. The method according to claim 5, comprising the step of adding an alkali to said solution.

7. The method according to claim 5, comprising the step of controlling a pH of said solution to control a vapor pressure of the generated hydrogen sulfide.  
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8. The method according to claim 7, comprising the step of adding acid to said solution to lower the pH thereof and increase the vapor pressure of the generated hydrogen sulfide.

5 9. The method according to claim 7, comprising the step of adding alkali to said solution to raise the pH thereof and decrease the vapor pressure of the generated hydrogen sulfide.

10. The method according to claim 5, comprising the steps of mixing the hydrogen sulfide with air and supplying the mixture of air and hydrogen sulfide into the industrial gas.

10 11. The method according to claim 1, comprising the step of adding an acid to green liquor to generate the hydrogen sulfide.

12. The method according to claim 11, comprising the step of controlling a pH of the green liquor to control a vapor pressure of the generated hydrogen sulfide.

15 13. The method according to claim 12, comprising the step of adding acid to said green liquor to lower the pH thereof and increase the vapor pressure of the generated hydrogen sulfide.

14. The method according to claim 12, comprising the step of adding alkali to said green liquor to raise the pH thereof and decrease the vapor pressure of the generated hydrogen sulfide.

20 15. The method according to claim 11, comprising the steps of mixing the hydrogen sulfide with air and supplying the mixture of air and hydrogen sulfide into the industrial gas.

16. In an apparatus using a scrubber for receiving and scrubbing an industrial gas containing mercury with an aqueous alkali reagent, the improvement comprising: means for

generating hydrogen sulfide; and means for supplying the hydrogen sulfide to the industrial gas upstream of the scrubber.

17. The apparatus according to claim 16, wherein the means for generating hydrogen sulfide comprises a hydrogen sulfide generating system including tank means for providing a solution of one of aqueous sodium sulfide and potassium sulfide, acid supply means for providing a supply of acid to said solution to generate the hydrogen sulfide, and means for supplying air to said tank means to convey a mixture of air and hydrogen sulfide from said tank means.

18. The apparatus according to claim 17, comprising means for conveying the mixture of hydrogen sulfide and air from said tank means to a flue conveying said industrial gas.

19. The apparatus according to claim 18, comprising a hydrogen sulfide/air injection system for introducing the mixture of hydrogen sulfide and air into the industrial gas.

20. The apparatus according to claim 19, wherein the hydrogen sulfide/air injection system comprises a plurality of pipes having apertures therein for discharging the mixture into the industrial gas.

21. The apparatus according to claim 19, wherein the hydrogen sulfide/air injection system comprises a plurality of air foils having apertures therein for discharging the mixture into the industrial gas.

22. The apparatus according to claim 16, wherein the means for generating hydrogen sulfide comprises a hydrogen sulfide generating system including tank means for providing green liquor, acid supply means for providing a supply of acid to said green liquor to generate the hydrogen sulfide, and means for supplying air to said tank means to convey a mixture of air and hydrogen sulfide from said tank means.

23. The apparatus according to claim 22, comprising means for conveying the mixture of hydrogen sulfide and air from said tank means to a flue conveying said industrial gas.

24. The apparatus according to claim 23, comprising a hydrogen sulfide/air injection system for introducing the mixture of hydrogen sulfide and air into the industrial gas.

5 25. The apparatus according to claim 24, wherein the hydrogen sulfide/air injection system comprises a plurality of pipes having apertures therein for discharging the mixture into the industrial gas.

26. The apparatus according to claim 24, wherein the hydrogen sulfide/air injection system comprises a plurality of air foils having apertures therein for discharging the mixture into the industrial gas.

27. An apparatus for receiving and scrubbing an industrial gas containing mercury with an aqueous alkali reagent, comprising:

a scrubber for scrubbing the industrial gas with the aqueous alkali reagent;

flue means for conveying the industrial gas to the scrubber;

means for generating hydrogen sulfide; and

means for supplying the hydrogen sulfide into the industrial gas conveyed by the flue means.

28. The apparatus according to claim 27, wherein the hydrogen sulfide generating means comprises tank means for providing a solution of one of aqueous sodium sulfide and potassium sulfide, acid supply means for providing a supply of acid to said solution to generate the hydrogen sulfide; and alkali supply means for providing a supply of alkali to said solution.

29. The apparatus according to claim 28, comprising means for controlling at least one of the supply of acid and alkali to said solution to adjust the pH of said solution and thereby control a vapor pressure of the generated hydrogen sulfide within the tank means.

30. The apparatus according to claim 28, wherein the means for supplying the hydrogen sulfide into the industrial gas comprises: means for supplying air to said tank means to convey a mixture of air and hydrogen sulfide from said tank means; and at least one of a plurality of pipes and a plurality of air foils, each having apertures therein, for discharging the mixture of hydrogen sulfide and air into the flue conveying the industrial gas.

31. The apparatus according to claim 27, wherein the hydrogen sulfide generating means comprises tank means for providing green liquor, acid supply means for providing a supply of acid to said green liquor to generate the hydrogen sulfide; and alkali supply means for providing a supply of alkali to said green liquor.

32. The apparatus according to claim 31, comprising means for controlling at least one of the supply of acid and alkali to said green liquor to adjust the pH of the green liquor and thereby control a vapor pressure of the generated hydrogen sulfide within the tank means.

33. The method according to claim 1, wherein the scrubber is a dry scrubber and further comprising the steps of conveying the industrial gas through the dry scrubber and then through one of a fabric filter and electrostatic precipitator to remove particulates from the industrial gas.

34. The apparatus according to claim 16, wherein the scrubber is a dry scrubber.

35. The apparatus according to claim 16, wherein the scrubber is a wet scrubber.

36. The apparatus according to claim 27, wherein the scrubber is a dry scrubber.

37. The apparatus according to claim 27, wherein the scrubber is a wet scrubber.